

DEPARTMENT OF AERONAUTICS AND ASTRONAUTICS
SCHOOL OF ENGINEERING

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASSACHUSETTS 02139

Room 37-155
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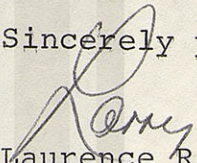
Dr. Sherman P. Vinograd
6529 Fothoron Road
McLean, Virginia 22101

Dear Sherm:

A short note to express my thanks and appreciation for your superb effort in organizing the Aerospace and Undersea Medicine Summer Program at M.I.T. The students' comments reflect the obvious - that the goal of a spirited educational experience with outstanding speakers was achieved.

Congratulations.

Sincerely yours,


Laurence R. Young
Associate Professor

am



Program 16.445 Critique

This course fully satisfied my requirements i.e. to get a relatively current and dynamic overview; to be exposed to the latest bio-med S+T interface with engineering concepts; and to gather ideas for recycling against U.S. government requirements. The programming was reasonable under the known constraints; the lecturers for the most part were informative and amenable to questions and expansion of their dialogue. The interplay was excellent from the standpoint of frankness and mutual technical exchange.

This course deserves to be continued as a NASA - University effort. Timing might depend upon major advances - or ~~at~~ a period just prior or after significant named spaceflight efforts. It need not be a yearly event, although it may work out that way. I also believe that with major changes, repeat monitoring should be encouraged and considered in programming. Whether intended or not, this course serves as an intra-community interface, in many ways, for more valuable than the Aerospace Assoc.

There is a definite physiological fatigue factor in 2 weeks of hard listening; but the data flow never contributed to this problem, largely because of (in the main) a ^{considerable} ~~large~~ measure of technical excellence.

Thank You for the opportunity -

Julian Hoptner Ph.D.

- Course Comments -

Mr. Vinograd,

I think this was an excellent course in general. Most of the speakers were well prepared. Although things kept at an interesting pace - time was quite cramped and some of the days were a little too long. I realized that the questions generated by the audience didn't help this although possibly the speakers could have been briefed a little more as to the necessity of staying within their time limit.

The only other criticism I feel is worth commenting on is that some of the speaker appeared to have no knowledge of the depth of experience held by the audience in general and seemed to only know vaguely that there were some engineers + some physicians present.

On the positive side - I feel the course planning was excellent - starting with the more basic sciences and moving to the practical applications in space flight or deep sea operations.

I think the course should continue to be an annual event and should receive more widely spread publicity amongst the people engaged in the specialties of aerospace + undersea medicine.

The size of the class is good - 30-40. - Any more would be too large + cause more delays in already crowded question periods.

As new information + research develops - I would be most interested in attending this course again.

Dr. Young and his staff did an excellent job hosting the program - providing class space +, of course, excellent coffee + doughnuts.

I would give a general rating of excellent to the whole works.

Lawrence J. Ender
Lt. Col. - USAF MC -

USAF Sch. of Aero. Med. - (SMKA.)
Brooks AFB, Texas 78235

Critique of 16.44s.

Suggest one lecture on biophysics of body temperature regulation be added to the already excellent summary of human physiology.

J. M. Witherston

Critique

Overall organization was well laid out.

Scheduling could have been timed much better and a lecture could have been set up for the wives in the evening by one of the more interesting lecturers.

Suggest that some discussion of the nebulous concept of "man rating" be included. Nearly every speaker has talked around it but none have said it.

Cl Rogers

Suggestions for Documenting the Aerospace and Undersea Medicine Seminar

- ① Type all lectures given on tapes and distribute to all attendees!
(if it is not going to be published)
(- still it should be sent to all attendees at no cost)
- ② Take any slides or view graphs showing block diagrams, functional descriptions, lecture/topic outlines and engineering drawings/sketches and Xerox them after/before lecturer delivers his presentation - include these in the typed notes as references!

This will greatly improve and increase the value received by each attendee in the course - since there is an overflow point for

each individual (over flow of
subject matter - you can only copy or
reproduce data so fast - ref. your
lecture today on Manual Control -
also you're trying to listen and/or look
at a diagram and write notes at
some time +

Barney A. Roberts

I found the course very informative since I started with no physiological or medical knowledge. In general, the lecturers gave clear presentations, and many (but not all) explained things in easy-to-understand terms.

The following points are suggestions that might be considered for the next presentation of the course

1. More comprehensive lecture notes distributed beforehand would allow students to concentrate on what the lecturer is saying. These notes would be valuable for current and later reference, especially when supplemented with references or a bibliography

2. It would be beneficial if the lecturers could summarize their presentation in several key statements. This would be valuable for those who need to remember the main points and not the details.

R. E. Curry

16.44s

Overview & Comments

The benefits of this course can be summarized under two categories; those derived from the lecturers and those derived from interaction between the students.

The lecturers provided during the course were excellent. It is difficult to imagine a more eminent and knowledgeable group in the Aerospace and Undersea Medicine area. In most cases the material presented was derived from the research activities and first hand experiences of the individual lecturers. One problem that soon became apparent was the conflicting requirements for tailoring the material presented to those students who were poorly grounded in the life sciences, while keeping it at a level to interest the biomedical personnel in the class. There is no good solution to the problem, however, it is my opinion that less time should be spent on the basic material.

Probably the most rewarding period of each lecturer's presentation was the discussion period at the end of each lecture.

The individuals taking the course were a diverse and interesting group and a large portion of the benefits from the course can be ascribed to discussions within the student group. It is believed that more opportunities for organized discussions would increase the benefits from the course.

Aerospace and Undersea Medicine

To properly critique a course of this nature one must reassess his reasons for attending. In my particular case, the purpose of attending the session was twofold - 1) To update my knowledge in the areas of aerospace and undersea medicine, and 2) To meet those individuals considered experts in those subjects important to aerospace and undersea medicine. These goals were achieved, therefore I consider my time well invested and most beneficial. The group attending was not selected, hence often, as I am sure each of us felt, I needed more detail and at other times, much less would have been adequate.

The success of the meeting was in the talents of the speakers and the organization. The speakers were, unquestionably, thoroughly familiar with their own field and could speak with confidence in answering questions. The question and answer periods were adequate and not rushed. Activities and breaks were planned and most enjoyable.

The failures were few and not devastating. The speakers could have been given a more specific subject and asked to give a brief introduction, rather than be expected to review his entire field. It would have been interesting to have asked each man how he felt his field would be changed or modified by our new adventures into space and the sea. For the most part, the notes made available were not adequate and many were missing entirely. For a course of this nature, a reference list or suggested readings could have extended interest stimulated during the presentation, for the future. For my part, I would have liked to have heard each speaker for two hours and have had fewer presentations, ending the day by 4:30 or 5:00. This would allow more time at the end of the day to review the day's notes and

possibly read more on the particular area before the next session.

In summary, the meeting was a success for me. My time was well invested and my view has been enlarged. The appreciation for areas I found before uninteresting has been stimulated anew. I return with an enlarged perspective.

Dr. Robert Allen

Critique—

The course was well planned and well conducted. The overrun in time was due to class participation and enthusiasm and consequently was worth the time expended.

Generally the course content and choice of lecturers was excellent. However, a handout of at least an outline of the lecture and references would be handy and possibly save time.

Bob Daly

P.S. Those seats were not designed for long duration missions.

16.445 Engineering Aspects of Aerospace and Underseas
Medicine

CRITIQUE:

The program was well conceived, organized and managed or at least it appeared that way to the participants, which is the most important thing after all. The comments in the dorm and over table were either of interest in the presentations or favorable comments on the benefits of the program.

My major comment of a constructive nature is that considering the qualifications of the attendees the instruction should be more participative. This would require less speakers and more time to query and interchange information with these experts.

I think an early break off one day per week for personal business, shopping, sight seeing, etc would be a benefit. and ease the gripes about hours, chairs, etc which are superficial and I feel only symptomatic of general tiredness from a heavy schedule and lack of personal time off.

My last comment is personal. I don't like to be read to. I feel an expert in a field should be able to present his field with enthusiasm and not read a scientific paper which I could read myself. I want him to tell me what he's excited about.

Orval H. Minney
22 August 1969

Commentary re: Aerospace Indonesia Seminar.
Aug 22 1969.

- ~~One~~ the whole I found the session thoroughly worthwhile and would attend future series should the opportunity arise.
- The speakers and topics with unusually few exceptions were of great interest and articulately presented.
- In my opinion there was an underestimation of the level of background of the attendees and as a result an excessive amount of time was spent in by highly advanced individuals presenting unnecessarily basic background material before getting to their primary contribution.
- Although many discussion periods were scheduled throughout the session

unfortunately the large majority of these periods were utilized as buffers to absorb "run overs" by the speakers. I personally would have liked to have seen an increase in the interactions between the attendees + speakers and amongst the attendees themselves.

- While the total hours per day were long, in all my contacts with fellow students I heard of no real complaint. Long sessions were expected and accepted as reasonable.

Many Thanks.
Ged Snaiton.

®

CRITIQUE
AEROSPACE & UNDERSEA MEDICINE

A. S. LURIE M.D.
363 LOWELL ST.
PEABODY, MASS 01960

From The medical practitioner's point of view, This course was very exciting!! This was the first course I have ever taken where engineers participated and where engineering medical problems were presented & discussed.

There were several presentations that were "over my head", but I suppose this is to be expected. I might add that it took me awhile to catch onto engineering "lingo".

Although there was little practical aspects which I can apply in the day to day treatment of patients I believe the course has enabled me to get a good background in Aerospace and Undersea Medicine. As a suggestion it might be advisable to give a basic engineering lecture for physicians in terms of physics, ^{terms} gravity... etc.

I hope to be able to present several ideas obtained from the lectures to my hospital staff about future and presently applicable medical engineering devices.

Thank you / A-S Lurie

R. SAWYER, M.D.

COURSE CRITIQUE

8-22-69

GENERAL: 1. GOOD HEARING EXPERIENCE

2. EXCELLENT CONTACTS, KNOWING WHO TO CALL/VISIT TO LEARN MORE DETAILS

SPEAKERS: 1. FELT THAT MANY OF THE SPEAKERS LACKED RELIABLE KNOWLEDGE OF REAL TIME, MANY SUBJECTIVELY TALKED 30 MIN, WHICH IN REAL TIME WAS 120 MIN, AND SEEMED TO ME 360 MIN.

2. A VERY FEW DIDN'T REALLY PRESENT MATERIAL WELL - INFO TRANSFER IS ORIENTED, AND A STEEP KNOWLEDGE GRADIENT DOESN'T INCURE TRANSFER OF INFORMATION IF THE SPEAKER CAN'T DELIVER.

SCHEDULING: 1. FELT MORE RIGIDITY NEEDED IN KEEPING TO SCHEDULED TIME DURATION OF INDIVIDUAL TALKS

SUBJECTS: 1. IF A RELIABLE, KNOWLEDGEABLE SPEAKER COULD BE FOUND (DIFFICULT) A TALK ON POLARIS SUMMARIZING PATROLS & DATA SUMMARY SHOULD BE GIVEN. INTERESTING AS TO ATMOSPHERE CONTROL, MEDICAL, HUMAN FACTORS. SPEAKER SHOULD HAVE MADE PATROLS AND BE PRIVY TO PATROL REPORT DATA.

PERSONAL: 1. WOULD HAVE APPRECIATED ONE HALF-DAY EACH WEEK S SCHEDULED TALKS - TO VISIT STORES, TAKE A WALK, SEE MUSEUMS, THROW ROCKS IN THE RIVER, ETC, ETC. THIS WOULD BE BENEFICIAL IF MADE ON WED OR THURSDAY.

2. FOUND THAT FATIGUE WAS PRESENT - MENTAL NOOTHY - FELT REALLY POOPED AFTER A DAY OF TALKS.

SUMMARY: 1. OUTSTANDING TWO WEEKS, VERY GLAD TO HAVE BEEN HERE

COMMENTS ON MIT SUMMER SESSION 16.44s

ENGINEERING ASPECTS OF AEROSPACE & UNDERSEA MEDICINE

1. FOR LONG DURATION FLIGHTS WE NEED TO KNOW MORE ABOUT INTERACTION EFFECTS OF GASEOUS, THERMAL, PRESS, RADIATION, ILLUM, SONIC, FOOD & WATER INTAKE, ETC ("UNIVERSAL COMFORT EQUATION") I.E. EFFECT OF INCREASED STRESS FROM EACH VARIABLE ON HUMAN TOLERANCE TO EACH OTHER VARIABLE. THIS ASPECT OF OVERALL PROBLEM NOT DISCUSSED AT ALL IN THE PROGRAM.
2. OVERALL CONTENT OF PROGRAM WAS VERY GOOD - TOP PEOPLE IN FIELD PRESENT. HEAVY EMPHASIS ON GOVT AGENCIES & UNIVERSITIES - WHY NOT MORE PRESENTATIONS FROM INDUSTRY?
3. GENERAL REFERENCES IN EACH FIELD SHOULD HAVE BEEN PRESENTED IN A BIBLIOGRAPHY LIST - THIS SHOULD BE DIFFERENTIATED FROM SPECIFIC REFS SUPPLIED BY INDIVIDUAL SPEAKERS.
4. USE OF SPEAKER ABSTRACTS GOOD; BIOGRAPHICAL NOTES ON EACH SPEAKER WOULD HAVE BEEN DESIRABLE.
5. FULL PROGRAM DETAILS NOT AVAILABLE BEFOREHAND - I.E. RECEPTION ANNOUNCED IN MORNING OF SUBJECT DAY; BANQUET DETLS NOT ANNOUNCED TILL RESERVATIONS REQUESTED - COST?, GUESTS (WIVES)?, PROGRAM SPEAKER?
6. SEATING VERY POOR FOR MORE THAN FEW HRS EACH DAY.

L.L. BOYER, JR
22 AUG 1969

August 22, 1969

Aerospace & Undersea Medicine Review

SHIRO FURUKAWA, M.D.
General Electric Co.
Consultant, Biomedical
Engineering, Apollo System,
Houston, Texas

In general the program was fruitful & entertaining. It seems like such program accelerates personal acquaintance and breakthrough between medical personnel and engineer in understanding of problems & their communication block. Impressions on various aspects of this summer program are as follow:

(1) Classroom & proceeding procedures of the program:

Satisfactory

(2) Presentation method: Proper, however, some of the interesting view-graphs could be distributed to the participant before class.

(3) Content of subjects in the program

a). Lecture on the biomedical microbial control was rather disappointing.

Problems of microbial shift of their domain within a closed ecology system like a spacecraft in long term space mission including man's intestinal flora should have been discussed.

b). Contents of electromagnetic effects on man was relatively poor

c). Lectures otherwise were exceedingly good such as Dr. Schmitt's ECG parameters & its display etc.

(4) References presentation in each subject should have been done ⁱⁿ better way.

(5) Question & answer were profitable in general, but there may be better way, for example applying written question card or other methods

In conclusion, the concentration of efforts in the program in areas of ① State-of-the-art (brief), ② existing problems, ③ predicted problems in future, ④ present concept, research & developments to meet these problems, and ⑤ energetic discussion of the problems by the participants, should be emphasized in the program.

- End. -

N. J. BRANDT

AUGUST 22, 1969

1. THE COURSE MET MY EXPECTATION, WHICH WAS TO BE EXPOSED TO THE STATE OF THE ART AND THE AREAS OF CONCERN IN AEROSPACE MEDICINE.
2. THE QUALITY OF THE INFORMATION PRESENTED WAS OUTSTANDING. WITH FEW EXCEPTIONS, THE LECTURERS WERE QUITE EFFECTIVE IN MEETING THE NEEDS OF THE CLASS.
3. THE SCHEDULE, ARRANGEMENTS, DURATION, FACILITIES ETC. WERE ALL SATISFACTORY. THE CAMPUS PROVIDED A CONVENIENT ENVIRONMENT.
4. FOLLOW-UP SESSIONS, PRESENTING EXTENSION AND UPDATE OF THE MATERIAL, PERHAPS ON AN ANNUAL BASIS, WOULD BE VALUABLE. REVISION OF PREVIOUSLY PRESENTED MATERIAL WOULD HAVE TO BE CONTROLLED, TO BE EFFECTIVE.

N. J. Brandt

®

Course layout - Excellent

Topic Selection - "

Speakers - a very few were too formal and lengthy. Would have preferred more discussion and question time.

Course Value - very valuable and informative. Mix of engineering & medical and significance of interfaces were in general clearly presented.

Suggested Improvements - I personally would have been happier with a few evening sessions in order to have had a little free afternoon or morning time.

Start at 1 PM some days.

" " 8 AM - Break - restart 6 PM?

M.I.T. Facilities - Excellent - personnel anxious to be of assistance.

Physical provisions were outstanding except for the seats.

The selection of speakers and topics has been outstanding, and I feel I gained far more from this course than I really expected.

Generally, the organization of topics flowed well and provided sufficient background for future talks.

It is obviously impossible to have all the speakers adhere to rigid scheduling, but some effort should have been made to allow for less formal presentation and more participation from the group, within the allotted time. If the speakers could all have remained until the end of the day for a "post-mortem" discussion of 60-90 minutes it would have been beneficial. Perhaps fewer speakers, or some night sessions would help accomplish this.

In summation: The over-all quality of both speaker and presentation was excellent. You must be congratulated on getting these people. I think the measure of success can be seen from the uniformly high class attendance and level of questioning.

The course has been well worth the time spent and I am extremely pleased I was privileged to attend.

J. Smyke

General

This course was well conceived and structured. The quality of the speakers was, in general, outstanding.

Specific

1. Scheduling was adequate and the changing schedules did not present a problem.

2. I recommend one afternoon each week be left open. The lost time could be made up by scheduling one evening per week.

3. Interest by the group in aviation problems was high. I recommend this area be continued or perhaps even expanded.

4. Training is important in all areas of aerospace and undersea medicine. Some emphasis should be placed on this phase.

5. Course handout (gray folder): This should include transportation maps, etc., since few have or want to use their cars. A map of the city would also be helpful.

William E. Overacker, Major, USAF
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Aerospace & Undersea Medicine
8/22/69

Miscellaneous notes:

1. Distribution of more detailed notes would have been helpful, especially since so many of the lectures used extensive graphic aids, which are difficult to transcribe manually.
2. The chairs were extremely uncomfortable.
3. If main purpose of the course was to familiarize the participants with the general aspects of ~~the~~ space/sea travel, it was successful.
4. The most interesting portions of the course were those that touched on the most current, on-going programs, such as the films of Mars, & Piccard's trip.
5. Most unusual: the acoustics were excellent.

Course Comments

1. Overall program was excellent.
2. A few talks were "weak"
3. Should give one afternoon off (1st Friday?)
4. Fantastic coverage of Apollo
5. Points covered have will have direct effect on some of my future work.
6. Good idea to include under-water activities as well as Space.

Aerospace and Undersea Medicine

August 1969

Fleur L. Strand
New York University
(Biology Dept)

General Comments

This has been one of the most stimulating courses I have ever taken, due to the variety of topics covered, the general excellence of the lecturers and the informal atmosphere inspired by the warmth and friendliness of the course directors, Dr Vinograd and Prof. Young.

Specific Comments

1. Some lecturers were too general in their coverage, even considering the varied background of the participants. The subject matter could have been treated in greater depth. To ensure that all participants have an adequate understanding of the basic material, I would suggest that a fundamental bibliography (of readily accessible texts and journals) be prepared before the course starts and sent to the registrants. Each lecturer should provide 2 or 3 (not more) basic readings which could be studied before the students come to class, if they felt their background required this.

2. The lecturers should provide more detailed references on their outlines for later use by the students. The quality of these outlines is very varied. I realize this is a reflection of the great number of different speakers, but perhaps a model outline could be provided as a guideline.

3. Demonstrations are excellent and more should be included if practical. The use of films was very good.

Many thanks for an unforgettable experience.

P.S. If at all feasible, a small reading-room stocked with

the references suggested by the lecturers, would be invaluable. This room should be open when classes are not in session. A copier would also be a great asset.

22 August 1969

Dr. Martin R. Pereira
Grumman Aerospace Corp.
Bethpage, N.Y. 11714

Aerospace & Undersea Medicine

In general, the organization of the summer refresher course under heading, was perfect. The subjects offered were most pertinent, taking into account the heterogeneity of the attendants.

There were small setbacks which apparently cannot be avoided in operations like the course under discussion. Not all speakers adhered to the time allotted to them. This practice was the major upset of the fine program offered. The so necessary and welcome question periods also did their part in upsetting the time schedule.

In evaluating the value of the lectures offered, a personal bias as regards areas of interest cannot be avoided, as this aspect is highly dependent on educational background. The most interesting and best conducted lectures were:

General Neurology

Vestibular Function

The regulation of fluid & electrolyte equilibrium

Biochemistry in a weightless environment

Hematology

Space radiation and magnetic field environments

Neurological data processing

Spacecraft medical & behavioral experiments program

Physiological aspects of undersea activity

Deep submergence research vehicles

Undersea exploration

The selection of the above lectures does not mean that the others, not mentioned, were bad. Far from it, but it has to be admitted that some presentations were better than others, and some of more personal interest than others.

Apart from the value of the program, the social aspect should not be overlooked. Many new contacts were laid. Therefore, it is hoped that these meetings will be continued in future so that our

Knowledge of the Space/Undersea field can be kept up to date by new inputs & contacts.

The word "data" is used in a singular aspect by many educated people who have no knowledge of Latin. To people who were steeped in Latin from teenage on, this mishandling, in the name of correct American language, of Latin is nauseating:

Latin: Neutral words ending in -um in singular, end in -a in plural,
e.g. DATUM - DATA

masculine words ending in -us in singular, end in -i in plural,
e.g. GYRUS - GYRI

Feminine words ending in -a in singular, end in -ae in plural,
e.g. LAMINA - LAMINAE.